

**Interim Guidelines  
for the Control and Prevention of  
Methicillin-Resistant *Staphylococcus aureus* (MRSA)  
Skin and Soft Tissue Infections  
in Non-Healthcare Settings  
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Prepared by:  
Montana Department of Public Health and Human Services  
Communicable Disease Control and Prevention Bureau



# **Interim Guidelines for the Control and Prevention of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Skin and Soft Tissue Infections in Non-Healthcare Settings**

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## I. Introduction

The purpose of this document is to provide information and establish uniform strategies for use by Montana public health personnel in the control and prevention of methicillin-resistant *Staphylococcus aureus* (MRSA) skin and soft tissue infections in community settings.

These guidelines do not address the clinical management of MRSA, management of MRSA in healthcare settings, or management of MRSA in long term care facilities (LTCs). The Centers for Disease Control and Prevention (CDC) released two documents in 2006 which provide guidance regarding the clinical management and management of MRSA in health care settings. <sup>1, 2</sup> For LTCs, excellent guidance is available through the Society of Healthcare Epidemiology of America (SHEA).<sup>26, 33</sup> The CDC has not yet released guidance regarding the public health management of MRSA in community settings, therefore the Montana Department of Public Health and Human Services has developed these interim guidelines to serve as a resource for Montana's public health personnel.

Over the last ten years, the incidence of MRSA infections has increased around the country including Montana. An increased number of anecdotal reports as well as surveillance data from Montana's clinical laboratories highlight the disturbing trend in Montana. The effort to stem the occurrence of MRSA in Montana communities begins with consistent control and prevention measures.

## II. Background

*Staphylococcus aureus*, often referred to simply as "staph," are bacteria commonly carried on the skin or in the nose of healthy people. Approximately 25% to 30% of the population is colonized (when bacteria are present, but not causing an infection) in the nose with staph bacteria. *S. aureus* are one of the most common causes of skin and soft-tissue infections (SSTIs) in the United States. Most of these skin infections are minor, such as pimples and boils, and can be treated without antibiotics (also known as antimicrobials or antibacterials). However, staph bacteria also can cause serious infections, such as surgical wound infections, bloodstream infections, and pneumonia.

Some *S. aureus* are resistant to antibiotics; MRSA is a type of staph that is resistant to antibiotics called beta-lactams. Beta-lactam antibiotics include methicillin and other more common antibiotics such as oxacillin, penicillin and amoxicillin.

Staph infections, including MRSA, occur most frequently among persons in hospitals and healthcare facilities (such as nursing homes and dialysis centers) who have weakened immune systems. Since 1961 when MRSA was first described<sup>4</sup>, the genetic strains of MRSA circulating in healthcare facilities have been similar and identified as healthcare-associated MRSA (HA-MRSA)

Reports of MRSA infections in previously healthy persons without established healthcare risk factors have increased since the mid-1990s. The term community-associated MRSA (CA-MRSA) has been used to describe this type of infection. The bacteriologic characteristics (e.g., genotypes, antimicrobial susceptibility profiles) for isolates obtained from patients with CA-MRSA infections<sup>5</sup> differ from those of HA-MRSA.

Today, hospital strains of MRSA have ‘spilled over’ into the community and community strains have spread into the hospitals, blurring the lines between the HA and CA-MRSA definitions.<sup>31</sup> For the purposes of these guidelines, distinguishing between HA and CA-MRSA is not necessary. These guidelines delineate control and prevention of community-onset MRSA (CO-MRSA) and perhaps even more broadly, SSTIs caused by *Staphylococcus aureus*.

Individuals in the community with MRSA infections commonly complain of “an infected pimple” or “spider bite”. SSTIs, specifically furuncles (abscessed hair follicles or “boils”), carbuncles (coalesced masses of furuncles), and abscesses, are the most frequently reported clinical manifestations.<sup>1</sup>

### III. Epidemiology

#### Burden of Disease

Incidence of CO-MRSA in the United States varies geographically and by setting. MRSA is not reportable in most states however as of 2005, twenty-one states conducted some type of active or passive MRSA surveillance. A number of studies have attempted to determine its prevalence. The consensus is that the incidence of MRSA infections is generally on the increase around the country. Prior to 2000, MRSA was relatively uncommon in SSTIs, accounting for approximately 3 percent of infections depending on location.<sup>6</sup> More recent data from studies of SSTIs in emergency departments determined that 59 percent were attributed to MRSA.<sup>7</sup> However the proportion of these MRSA infections varied substantially by study location, Kansas City and Atlanta at 74 and 72 percent MRSA respectively while New York had 15 percent MRSA.

Data from Montana also indicate that the incidence is increasing. Antibigram surveillance data of *S. aureus* isolates from Montana’s clinical laboratories spanning a ten year period, illustrate this point. (See Table 1) Between 1996 and 2005, the percent of *S. aureus* isolates reported as MRSA has more than doubled from 17% to 38%.

**Table 1:** Number of *S. aureus* isolates and percent MRSA, Montana, 1996-2005 (unpublished data)

Year	Number of Labs providing AST data for <i>S. aureus</i>	Number of MRSA isolates reported*	Total # of <i>S. aureus</i> isolates tested for methicillin resistance <sup>†</sup>	% MRSA
1996	13	378	2281	17%
2002	21	1032	4518	23%
2005	36	2664	7052	38%

\* These numbers represent MRSA isolates from all sources.

<sup>†</sup> Historically, resistance to the penicillinase-stable penicillins has been referred to as “methicillin resistance” even though methicillin is no longer the agent of choice for testing or treatment<sup>37</sup>. These numbers actually represent the number of isolates tested for oxacillin resistance.

#### Mode of Transmission

The main mode of transmission of staph including MRSA is via hands which may become contaminated by contact with a) colonized or infected individuals, b) colonized or infected body sites of other persons, or c) devices, items, or environmental surfaces contaminated with body fluids containing staph or MRSA. Breaks in the skin facilitate *S. aureus* entry into the body. Other factors contributing to transmission include skin-to-skin contact, crowded conditions, and poor hygiene.<sup>8</sup> The sharing of towels, personal

hygiene items, athletic equipment, clothes, non-sterilized tattoo instruments, and illicit drug paraphernalia also facilitate the transmission of *S.aureus* from one individual to another.

### Reservoirs

Colonized and infected individuals are the major reservoir of CA-MRSA. The prevalence of *S. aureus* colonization in the United States is estimated at 32% while MRSA colonization is estimated at approximately 0.8%.<sup>3</sup> Although MRSA has been isolated from environmental surfaces (e.g., floors, work areas, medical equipment) and pets<sup>23, 24</sup>, these are not considered to be the most likely sources of transmission.<sup>9</sup>

### Colonization vs. infection vs. invasive infection <sup>1, 9, 10</sup>

It is important to understand the difference between colonization and infection.

Colonization is the presence, growth, and multiplication of the organism without clinical symptoms or immune reaction. One of the most common sites of colonization is the nose (anterior nares) however MRSA colonization may also occur in the axilla, rectum, perineum, and chronic wounds. While persons may become colonized with MRSA (as they may with methicillin-susceptible *S. aureus*), they may not necessarily develop infections. These asymptomatic carriers may act as reservoirs for infection. A MRSA infection is an invasion and multiplication of MRSA in tissue with the manifestation of clinical symptoms of such as an increased white blood cell count, fever, lesions, drainage from a break in skin continuity and erythema. An invasive MRSA infection is the clinical manifestation of symptoms caused by MRSA such as furuncles, cellulitis, pneumonia, carbuncles, septicemia, osteomyelitis, or vascular line infection. After a person has been treated for a MRSA infection they may or may not remain colonized with MRSA.

### Risk factors

Although there have been documented outbreaks of CO-MRSA in numerous settings and associated with a number of activities, it is important to remember that CO-MRSA may occur in otherwise healthy persons with no traditional MRSA associated risk factors. CO-MRSA knows no age boundaries and has been documented in newborns, toddlers, teens, adults, and the elderly. A recent study (2007) concluded that there are no reliable epidemiologic or clinical risk factors to distinguish patients with CA-MRSA infection from patients with community-associated methicillin-susceptible *Staphylococcus aureus* (CA-MSSA) infection.<sup>11</sup> With that in mind there are some factors that should raise the level of suspicion for community-onset SSTIs being MRSA.<sup>5, 12</sup>

- Populations in which MRSA clusters have been documented
  - Athletes in contact sports
  - Intravenous drug and methamphetamine users
  - Inmates at correctional facilities
  - Military personnel
- Medical history
  - Recent hospitalization
  - Recurrent or recent antibiotic use
  - Past MRSA infections
  - Recurrent skin disease
  - Recurrent or recent skin damage

- Environmental conditions
  - Living in crowded or unsanitary conditions
  - Close contact with someone known to be infected or colonized with MRSA
  - Contact with a colonized pet
  - High incidence of MRSA in the community

#### IV. Management

##### Treatment

Clinical treatment of CO-MRSA infections will not be addressed in this document as there are a number of guidelines available to practitioners delineating this topic. Public health practitioners may refer health care providers to two excellent guidelines: 1) “Strategies for clinical management of MRSA in the community: Summary of an experts’ meeting convened by the Centers for Disease Control and Prevention-2006”<sup>1</sup> and 2) Washington State’s “Interim guidelines for evaluation & management of community associated methicillin resistant *Staphylococcus aureus* skin and soft tissue infections in outpatient settings.”<sup>12</sup>

##### When to obtain a culture<sup>1</sup>

Clinicians are encouraged to collect specimens for culture and antimicrobial susceptibility testing from all patients with abscesses or purulent skin lesions, particularly those with severe local infections, systemic signs of infection, or history suggesting connection to a cluster or outbreak of infections among epidemiologically linked individuals. Culture and susceptibility results are useful both for management of individual patients and to help determine local prevalence of *S. aureus* susceptibility to beta-lactam and non-beta-lactam antimicrobial agents. In an outbreak within a defined cohort, cultures should be obtained from all new onset cases at least until the susceptibility pattern of the outbreak strain has been determined. In a community where empiric therapy for SSTIs has been modified to provide coverage for MRSA, obtaining cultures of purulent SSTIs is still important to monitor trends in susceptibility of *S. aureus* to non-beta-lactam agents.

##### Screening<sup>5</sup>

As stated previously, colonized persons or asymptomatic carriers, may act as reservoirs for infection; therefore, identifying *S. aureus* carriers and eradicating the carriage state may theoretically prevent recurrent *S. aureus* infections or person-to-person spread. However, at present there is insufficient evidence to support the use of screening and eradication regimens in the community.<sup>14</sup>

In the non-outbreak setting, routinely screening individuals infected with CO-MRSA or their contacts for colonization of nares or other sites is not recommended. Screening might be considered for selected circumstances following consultation with public health or infectious disease clinicians. Such consultation may be sought in circumstances such as: individuals with recurrent *S. aureus* SSTIs for whom decolonization is being considered; in family settings where recurrent SSTIs continue despite repeated prevention measures; to investigate an outbreak in a closed population with recurrent infections despite repeated prevention measures.

##### Decolonization<sup>1</sup>

Decolonization refers to the process of eradicating or reducing carriage of a particular organism from the skin, nose or other mucosal surfaces.<sup>5</sup> Decolonization attempts are



generally not recommended in the community setting due to 1) lack of data on the effectiveness of decolonization regimens, 2) poor compliance with decolonization regimens, and 3) development of resistance to systemic and topical agents during decolonization therapy.<sup>1</sup> If decolonization is to be considered, it should be considered only after reinforcing the standard prevention measures (See **Section VI**) and documenting that this has been unsuccessful at interrupting transmission. Consultation with an infectious disease specialist is essential before any attempt at decolonization is made. The local health department should also be consulted if administration of decolonization regimens to a larger cohort (e.g., classroom, athletic team, group home, correctional facility) is being considered.

## **V. Surveillance and reporting**

### Reporting of community-onset MRSA outbreaks in non-healthcare settings

Montana's Administrative Rule 37.114.203 (1b) does require reports of outbreaks (i.e. "frequency in excess of normal expectancy"):

Public health officials should be notified of an occurrence in a community or region of a case or cases of **any** communicable disease in the "Control of Communicable Diseases Manual, An Official Report of the American Public Health Association", (18<sup>th</sup> edition, 2004) with a frequency in excess of normal expectancy.

Outbreaks or clusters of CO-MRSA infections may be captured by this rule even though individual cases of MRSA are not specifically reportable conditions in Montana. For the purposes of this guideline, a CO-MRSA "outbreak" is a cluster of four or more epidemiologically linked ("common setting" or "common venue" such as a family, school, or jail), culture confirmed cases with onset within a month long period. When in doubt of whether a number of CO-MRSA cases should be considered an outbreak, contact the local health department or the Montana Communicable Disease Control and Prevention Bureau at (406) 444-0273.

### Investigations of outbreaks

The majority of reported CO-MRSA outbreaks have been the result of SSTIs. Investigations of MRSA outbreaks have not provided much novel information useful for prevention. Most CO-MRSA outbreaks are not the result of single source, but result from transmission from person-to-person.<sup>13</sup> Before initiating an investigation of a MRSA outbreak, it is recommended that local public health personnel contact the Communicable Disease Control and Prevention Bureau and discuss the suspected outbreak with a Surveillance Epidemiologist.

## **VI. General prevention of SSTIs, including MRSA<sup>5</sup>**

The goal of community control of CO-MRSA is to prevent the spread of the bacteria from an infected or colonized individual to other persons in the community. This requires individuals to take a proactive role to limit transmission. As a general rule, the prevention of CO-MRSA and infections with other common skin pathogens requires consistent application and reinforcement of good hygienic practices with emphasis on hand washing, not sharing potentially contaminated personal articles, and the covering of draining skin lesions to prevent direct or indirect contact with infected secretions of another person. These measures are not specific to CO-MRSA, and apply to all draining lesions, wounds, or potentially infected sites. (See **Appendix A**) When in doubt of the most appropriate course of action to follow, contact your local public health department,



the Montana Communicable Disease Control and Prevention Bureau at (406) 444-0273, or your healthcare provider.

## VII. Prevention guidance for MRSA in specific settings

### A. Households

In addition to the general prevention messages the following measures can be recommended for households in which one or more members have a skin infection including a MRSA infection.

- The household environment should be regularly cleaned with a standard household detergent/disinfectant or bleach solution. A 1:100 solution of diluted household chlorine bleach (2.5 Tablespoons bleach in 1 gallon of water) can be used for non-porous surfaces (See Appendix A). Special attention should be paid to commonly touched items such as light switches, doorknobs, phones, toilets, sinks, tubs, kitchen counters, telephones (cellular and land-line), remote controls, and computer keyboards.
- Wash utensils and dishes in the usual manner with soap and warm water or using a standard home dishwasher.
- Individuals who are MRSA-positive, or their family members, should notify at the time of contact with the health care system that they are either MRSA-positive or living in a household with someone who is MRSA-positive.

### B. Schools<sup>15, 16</sup>

MRSA is a pathogen that knows no age boundaries. In 2006, the Montana Communicable Disease Control and Prevention Bureau received reports of students in Elementary, Middle, and High School students with MRSA. **Any infection or draining wound could pose a threat to others.** When a student with a SSTI is in the classroom, certain infection control measures should be in place. These measures include, but may not be limited to:

**Evaluate<sup>16</sup>:** The school nurse or physician should take an active role in evaluating students who complain of painful skin lesions, including lesions that resemble a “bug bite,” or other pustule skin lesion that appears to be infected. Any unusual skin lesion or other draining wound is potentially infectious to others and infection control measures should be in place to prevent the spread of infection (see following prevention strategies).

**Refer:** When a SSTI is suspected, students should be referred to their primary care provider for evaluation and treatment. (Those infected with MRSA should follow their healthcare provider’s treatment plan, including completing antibiotic therapy, if an antibiotic was prescribed.)<sup>16</sup>

**Communicate:** Following the medical evaluation, the student or parent should be asked to provide verification of the healthcare provider’s treatment plan to school officials. If a cluster or “outbreak” (**see Section V**) of MRSA is suspected within the school setting, school officials may want to contact the local public health department for consultation.

Montana schools may consider developing policies related to MRSA-infected students and related to prevention of skin infections in individuals participating in sports. Establishing a written procedure and schedule for routine surface cleaning of shared athletic equipment is also recommended. For assistance with policy development, contact the local public health department or the Montana Communicable Disease Control and Prevention Bureau at (406) 444-0273 for consultation.

**Prevention strategies:** It should be emphasized with school staff, parents, and students that hand washing is the single most important behavior in preventing the transmission of infectious disease. Hands should be washed for at least 15 seconds with soap and warm water OR an alcohol based hand sanitizer (at least 60% ethyl alcohol) may be used if hands are not visibly soiled and when washing with soap and water is impractical or unavailable.

- Pus from infected wounds can contain bacteria, including MRSA, and spread the bacteria to others. Bandages should be disposed in a manner such that others would not have contact with the drainage (e.g., in a closed baggie).
- In situations in which open wounds cannot be kept covered, consider temporary exclusion from the school until the wound has healed or drainage can be contained.<sup>5</sup>
- Practicing good basic hygiene. The infected student, medical staff, sport team staff, and anyone expected to have contact with the infected student must be diligent with hand hygiene. To this end, ensure availability of adequate soap and warm water. Advise the MRSA-infected student and all those who might have contact with the infected wound or wound dressing to thoroughly wash their hands using soap and warm water or use an alcohol-based hand sanitizer (if hands are not visibly soiled) immediately after contact. In addition, emphasize the importance of good hygiene overall, including showering and washing with soap after all practices and competitions.<sup>16</sup>
- Clean potentially contaminated surfaces carefully with a disinfectant or a bleach solution after caring for the wound. A 1:100 solution of diluted household chlorine bleach (2.5 Tablespoons bleach in 1 gallon of water) can be used for non-porous surfaces (See Appendix A).
- Ensure that frequently touched surfaces (e.g. counters, desks, and computers) are cleaned at least daily with a disinfectant solution.

MRSA colonized students in the classroom<sup>15</sup>

**Children colonized with MRSA should not be excluded from the classroom.** The reasons for this recommendation include:

- Since the prevalence of MRSA is increasing in the community, it is likely that there are colonized students in the classroom who are not aware that they harbor the organism. Thus, excluding a child known to be colonized with MRSA would be relatively ineffective in reducing the risk of MRSA infection to classmates.

- The risk for acquisition of MRSA in the school setting by children, including those who are medically or developmentally challenged, is no greater than the risk of contracting a skin infection caused by other pathogens.

The overall risk of infection from MRSA in the school setting will not be appreciably increased when children who are colonized with MRSA are admitted. The risk will not be appreciably decreased when colonized children are excluded. However, exclusion will adversely affect the children that may be colonized by depriving them of an education, without benefiting the children already present in the setting.

### C. Athletic settings

MRSA infections are increasingly being identified in participants in club, high school, collegiate, and professional athletics. These infections are usually associated with contact sports such as wrestling and football. Athletes with MRSA infections have been reported in Montana sports teams at the collegiate and high school levels. Although the incidence of MRSA infections in Montana athletic teams is unknown, it is expected to increase in the future as it has in other portions of the United States. These recommendations have been adapted from the Texas Department of State Health Services “Information on Staphylococcal Infections for School Athletic Departments”.<sup>17</sup>

**Evaluate:** Athletes should be encouraged to report skin lesions to coaches, athletic trainers, or other team staff. These individuals should take an active role in evaluating athletes who complain of painful skin lesions, including lesions that resemble “bug bites” or other pustule skin lesion that appears to be infected. Any unusual skin lesion or other draining wound is potentially infectious to others and infection control measures should be in place to prevent the spread of infection.

**Refer:** When a SSTI is suspected, athletes should be referred to their primary care provider or team physician for evaluation and treatment. The athlete with a suspected SSTI should be removed from activities requiring direct contact with others until evaluated by a physician.

**Communicate:** Following the medical evaluation, the athlete should be asked to provide verification of the healthcare provider’s treatment plan to school officials. If a cluster or “outbreak” (**see Section V**) of MRSA is suspected within the athletic setting, team officials should contact the local public health department for consultation.

It is also important for the athletic department, school administrators, and custodial staff to communicate with each other to ensure consistent wound care precautions and infection control strategies. Montana schools may consider developing policies related to MRSA-infected athletes and related to prevention of skin infections in individuals participating in sports. Establishing a written procedure and schedule for routine surface cleaning of shared athletic equipment is also recommended. Contact the local public health department or the Montana Communicable Disease Control and Prevention Bureau for consultation.

**Prevention strategies:** It should be emphasized with athletic staff and athletes that hand washing is the single most important behavior in preventing the transmission of infectious disease. Hands should be washed for at least 15 seconds with soap and warm water OR an alcohol based hand sanitizer (at least 60% ethyl alcohol) may be used if hands are not visibly soiled and when washing with soap and water is impractical or unavailable.

- Do not allow athletes with draining wounds or infections to participate in practice or games until the wound has stopped draining. Because MRSA may be difficult to treat, this may be a few weeks or longer.
- Permit the athlete to participate in non-contact activities if wounds are covered and the infected person observes good hygienic practices—washing hands, showering, and laundering clothes
- Clean sports equipment (e.g. mats, weight room benches, training room tables) or any part of the athletic area that comes in contact with a wound with commercial disinfectant or fresh solution of diluted bleach before any other athlete comes in contact with the equipment or area
- Athletic trainers or others who care for the wound should use clean non-sterile gloves. Put on clean gloves just before touching broken skin. Remove gloves promptly after use and discard before touching uncontaminated items and environmental surfaces and before treating another athlete. Wash hands immediately after contact with the wound even if gloves were worn. Wash hands between tasks and procedures on the same athlete to prevent cross-contamination of different body sites. Cover treatment tables and discard or launder coverings after each use.
- Place disposable items that have come in contact with the infected site in a separate trash bag and close the bag before placing in the common garbage.
- Do not give other team members prophylactic antibiotics or ointments.
- Other precautions for athletes
  - Shower with soap and water as soon as possible after direct contact sports
  - Do not share towels, soap, or other personal care items
  - Dry using a clean, dry towel
  - Do not share towels, even on the sidelines at game
- Laundry and general cleaning
  - Pre-wash or rinse items that have been grossly contaminated with body fluids
  - Wash towels, uniforms, scrimmage shirts, and any other laundry in hot water and ordinary detergent and dry on the hottest cycle.
  - Inform parents of these precautions if laundry is sent home (laundry must be in an impervious container or plastic bag for transporting home)

- Clean the athletic area and sports equipment at least weekly using a commercial disinfectant/ detergent or a fresh (mixed daily) bleach solution. A 1:100 solution of diluted household chlorine bleach (2.5 Tablespoons bleach in 1 gallon of water) can be used for non-porous surfaces (See Appendix A).

#### **D. Daycare settings**

MRSA is not specifically addressed in the Montana Health Care Requirements for Day Care Facilities (ARM 37.95.139)<sup>18</sup>, however Section (3c) of that ARM states the following:

Children with any of the bacterial infections listed below must be treated with antibiotics for 24 hours before they return to the day care center:

- (i) Strep throat;
- (ii) Scarlet fever;
- (iii) Impetigo;
- (iv) Bacterial conjunctivitis (pinkeye); and
- (v) Skin infections such as draining burn or infected wounds or hangnails

Excluding children with SSTIs documented to have “bacterial” cause who have not completed 24 hours of antibiotic therapy may not be appropriate because current medical practices may not dictate or recommend treatment with antibiotics. For the purposes of these guidelines the Montana DPHHS suggest the following recommendations for control and prevention of SSTIs in the day care setting. These recommendations have been adapted from the Texas Department of State Health Services “Information on Staphylococcal Infections for Day Care Administrators and Care Givers”.<sup>19</sup>

**Evaluate:** Caregivers at the daycare should take an active role in evaluating children who complain of painful skin lesions, including lesions that resemble “bug bites,” or other pustule skin lesion that appears to be infected. Any unusual skin lesion or other draining wound is potentially infectious to others and infection control measures should be in place to prevent the spread of infection.

**Refer:** When a SSTI is suspected, parents of the children should be referred to their primary care provider for evaluation and treatment.

**Communicate:** It is extremely important that parents communicate with caregivers regarding the infection control measures for any sores or wounds their children have. The physician may perform a culture and susceptibility test to determine what bacteria the child has and what treatment will be the most effective with the fewest side effects. The physician may determine that the child does not need an antibiotic. Therefore the daycare center should not require antibiotic treatment for readmission to daycare. If an antibiotic is prescribed, the child must take all medication even after the infection seems to have healed. Assure that the medications are administered in the correct dose and at the appropriate time. Never permit medications to be shared, not even topical medications. The physician may recommend that the child not attend daycare until the wound is no longer draining. If the child is permitted to attend daycare, follow the physician’s instructions for dressing changes, including application of a topical ointment if prescribed. Follow all directions as instructed by the physician. This will require careful communication between caregivers and parents. If the child does not

respond to treatment, insist that parents inform the physician. If a cluster or “outbreak” (**see Section V**) of MRSA is suspected within the daycare setting, daycare administrators should contact the local public health department for consultation.

It is also important for caregivers to communicate with each other to ensure consistent wound care precautions and prevention strategies. Daycares may consider developing a policy for control and prevention of SSTIs.

**Prevention strategies:** It should be emphasized with caregivers, parents, and children that handwashing is the single most important behavior in preventing the transmission of infectious disease. Hands should be washed for at least 15 seconds with soap and warm water OR an alcohol based hand sanitizer (at least 60% ethyl alcohol) may be used if hands are not visibly soiled and when washing with soap and water is impractical or unavailable.

- Exclusion: Situations in which open wounds cannot be kept covered, consider temporary exclusion from the daycare facility until the wound has healed or drainage can be contained.<sup>5</sup>
- If the wound is uncultured or you are not informed of the culture results, treat the wound as MRSA. Parents should be asked to inform the daycare facility of the culture results.
- Do not permit other children to come into contact with the infected child’s wound or a contaminated physical environment
- Do not permit any other children to use bedding or mats that are used by children with draining wounds
- The infected individual should have a designated chair or area for sitting. It should have a plastic or similar hard surface or cover for easy disinfection. No one else should sit here until the child’s wound has healed
- A changing table with an uncovered impervious surface should be wiped down with an effective disinfectant after use by an infected individual OR use an impervious disposable cover and dispose of after each child.
- Use gloves for changing dressings or touching the wound. Remove gloves promptly and discard after use, before touching uncontaminated items, environmental surfaces, and before touching another person. Wash hands immediately after contact with the wound even if gloves were worn.
- Place disposable items that have come in contact with the infected site in a separate trash bag and close the bag before placing in the common garbage.

#### **E. Residential chemical dependency and transitional living settings**

Skin and soft tissue infections have long been associated with intravenous drug use.<sup>35</sup> In addition, “a number of socioeconomic and behavioral risk factors associated with methamphetamine use may predispose individuals to MRSA skin infections, such as unclean drug injections, hypersexual behavior, and skin picking”.<sup>36</sup> Facilities housing individuals at increased risk for SSTIs should take an active role in identifying skin infections such as unusual skin lesions, draining wounds, or “spider bites” that may require further evaluation. In addition to the general prevention messages, a number

of measures can be recommended for residential chemical dependency treatment settings.

**Prevention strategies<sup>20</sup>:** It should be emphasized with residents and staff that handwashing is the single most important behavior in preventing the transmission of infectious disease. Hands should be washed for at least 15 seconds with soap and warm water OR an alcohol based hand sanitizer (at least 60% ethyl alcohol) may be used if hands are not visibly soiled and when washing with soap and water is impractical or unavailable.

- Residential treatment facilities may consider, as part of their facilities' infection control policies, including a section which addresses SSTIs and MRSA infections.
- Educate staff and residents on transmission, prevention, treatment, and containment of MRSA infections.
- Encourage people to wash their hands regularly with soap and warm water: before and after any physical contact with someone, before and after using the bathroom, before and after eating.
- Make soap/water or alcohol based hand sanitizers easily accessible for all residents.
- Encourage people to shower at least once a day using soap.
- If someone at your facility has MRSA, consider housing him/her in a single room. If this is not possible cohort the individual with other people with MRSA. This is especially important if they have a wound that is draining fluid.
- Residents involved with preparing or serving food who have draining wounds on the hands, wrists, or exposed portions of the arms should be restricted from activities requiring direct contact with food or food contact surfaces until the wound has stopped draining or unless the wound is covered with an impermeable cover in addition to the bandage. <sup>30</sup> (See **Section G.**)
- Do not let people share clothes, towels, soap, sheets and blankets, razors or other personal items.
- Launder towels and sheets regularly. All clothing and bedding items should be cleaned in hot water and ordinary detergent and dried on the hottest cycle.
- People who handle dirty laundry should use gloves when doing so.
- Clean common areas, especially bathrooms, with detergent/disinfectant or bleach solution at least once a day if possible. A 1:100 solution of diluted household chlorine bleach (2.5 Tablespoons bleach in 1 gallon of water) can be used for non-porous surfaces (See Appendix A). This includes toilet seats. If individuals have infections in their rectal or genital region, they should use



paper seat covers or clean and disinfect the toilet seat after every use.

- Remove wooden seats/chairs from bathroom areas and replace them with plastic or metal chairs that can be cleaned properly. You can also paint these wooden items with a waterproof paint, which can decrease the ability of bacteria to grow on the surface. If this is not possible, make sure people cover the wooden surface with clean cloth or paper (such as a towel or the paper used on exam tables) before sitting on it.

## F. Correctional facilities

Outbreaks of MRSA have been documented in incarcerated populations from around the United States.<sup>27</sup> The correctional facility setting poses a number of challenges to prevention and control of MRSA. The CDC identified a number of contributing factors to the transmission of MRSA in these settings.

First, investigators identified barriers to routine inmate hygiene. Access to soap often was limited or was restricted for security reasons, and new alcohol-based hand rubs were difficult to introduce because of misuse of these products. Mental health and behavior problems among inmates might have contributed to poor adherence and hindered efforts to improve hygiene. Inmates' clothing was washed by hand or in bulk loads, and potentially contaminated laundry might not have undergone sufficiently high water temperatures or drying to eliminate bacteria. Second, proper access to medical care was hindered by co-payments required for acute care visits and by inadequate supplies and staff for wound care. Third, frequent medical staff turnover was a challenge to providing education on proper infection-control procedures. Finally, MRSA might have been an unrecognized cause of skin infections among inmates; wounds often were attributed to spider bites, and cultures might have been collected infrequently even in cases in which antimicrobial treatment failed. <sup>27</sup>

Anecdotally, Montana's incarcerated population has struggled with increasing rates of MRSA infections but as of yet no data exist to confirm those reports. The recommendations in this document have been adapted from a comprehensive set of guidelines for correctional facilities issued by the Federal Bureau of Prisons "Management of methicillin-resistant *Staphylococcus aureus* (MRSA) Infections"<sup>28</sup> and Texas's "Prevention, Treatment, and Containment of Methicillin-Resistant *Staphylococcus aureus* Infections in County Jails".<sup>29</sup>

**Evaluate:** All inmates undergoing intake medical screening should be carefully evaluated for skin infections. Healthcare providers should also evaluate inmates for skin infections at physical examinations or medical evaluations for other conditions. All draining lesions should be considered MRSA unless proven otherwise.

**Refer:** Prompt referral of inmates with skin infections for a medical evaluation should be emphasized. Correctional officers should routinely refer inmates with visible or reported sores or wounds or inmates who self-report "boils," "lumps," "sore bumps" or "spider bites" to health services. To encourage inmates to seek treatment, any barriers to inmates' accessing healthcare for SSTI should be identified and addressed.

**Communicate:** It is extremely important that healthcare providers communicate with correction staff regarding the infection control measures for any sores or wounds the inmates have. It is also important for the correctional staff, administrators, and healthcare staff to communicate with each other to ensure consistent wound care precautions and prevention strategies. It may also be prudent for the correction facility to develop a policy addressing management of SSTIs and MRSA infections. If a cluster or “outbreak” (**see Section V**) of MRSA is suspected within the correctional facility, correctional administrators may want to contact the local public health department for consultation.

**Prevention strategies:** It should be emphasized with inmates and correctional staff that hand washing is the single most important behavior in preventing the transmission of infectious disease. Correctional staff, health care workers and inmates should periodically receive education on the importance of hand hygiene and effective hand hygiene techniques. Hands should be washed for at least 15 seconds with soap and warm water OR an alcohol based hand sanitizer (at least 60% ethyl alcohol) may be used if hands are not visibly soiled and when washing with soap and water is impractical or unavailable.

- Inmates who have a SSTI or a MRSA infection should follow the healthcare provider’s treatment plan, including completion of any antibiotics prescribed.
- Keep actively draining wounds covered with clean, dry bandages. The inmate should follow the healthcare provider’s instructions on proper care of the wound. The decision to allow inmates to change their own bandages should be made on a case-by-case basis considering the inmate’s mental status and any risks to security this might pose. Inmates who are allowed to change their own bandages will need access to gloves, soap and water, bandages, and plastic trash bags. They should receive instruction on the proper procedure for changing a bandage in order to minimize the possibility of cross-contamination.
- To prevent transmission to other persons, inmates with MRSA infection on the hand/wrist or face should be removed from responsibilities in food services, healthcare or hospice, laundry, barbershops, and any situations that might bring the wound or wound drainage into contact with other persons or personal items.
- Inmates with uncontained drainage who remain at the jail should be restricted from recreation and common areas. Separate toilet facilities are preferred and are a priority for inmates with draining peri-rectal or thigh lesions. Inmates with uncontained drainage should not shower at the same time as the general population; they should be issued two towels and instructed to use one to sit on as a barrier when using the bench in the dressing area. Toilet, shower, and dressing areas should be cleaned with a detergent and disinfected before the general population uses the facility again. These precautions may be discontinued 24 hours after the wound has resolved (drainage can be contained with a simple dressing or drainage has stopped) even if antibiotic therapy is incomplete.
- Single cell housing is not required for persons with non-draining MRSA skin infections or draining infection that can be contained by a simple dressing. The

patient should be instructed in personal hygiene and told to report worsening of infection and draining wounds. Single cell housing should be considered for mentally ill, cognitively impaired and uncooperative inmates, and the terminal cleaning of the cell should be done prior to assigning the cell to another inmate. The healthcare provider will decide about any restrictions on activities. Inmates with MRSA infections may be limited from certain activities on a case-by-case basis.

- Inmates and correctional staff should be provided information on the transmission, prevention, treatment, and containment of MRSA infections. Educational materials are available through the local public health department or Montana Communicable Disease Control and Prevention Bureau. New Jersey has developed an excellent MRSA educational video for inmates available at <http://www.state.nj.us/corrections/>.
- Inmates should have access to needed supplies and sufficient opportunities for good personal hygiene.
- Shared equipment or any other surface exposed to sweat should be disinfected daily with an EPA registered disinfectant or a 1:100 solution of diluted bleach (1 tablespoon of bleach in 1 quart of water) and routinely wiped clean between users with a clean dry towel. Persons using exercise equipment should use barriers to bare skin, such as a towel or clean shirt while using exercise equipment.

## **G. Food establishments**

The Montana Communicable Disease Control and Prevention Bureau has fielded numerous requests for guidance pertaining to food handlers with MRSA infections. In addition to causing SSTIs and other invasive infections, *Staphylococcus aureus*, when ingested, may cause Staphylococcal intoxication. Symptoms of this foodborne illness typically present 2 to 4 hours after ingestion and include nausea, vomiting, abdominal pain, diarrhea, and prostration. One factor that may contribute to this type of foodborne illness is handling of foods by persons with draining infectious wounds.<sup>21</sup> Currently the guidance from the Montana Food Service Establishments Administrative Rule<sup>22</sup> does not specifically address MRSA however ARM 37.110.210 (1) states the following:

No person, while infected with a disease in a communicable form that can be transmitted by foods or who is a carrier of organisms that cause such a disease or while afflicted with a boil, an infected wound, diarrheal illness or acute gastrointestinal illness or an acute respiratory infection, shall work in a food service establishment in any capacity in which there is likelihood of such person contaminating food or food contact surfaces with pathogenic organisms or transmitting disease to other persons.

Although SSTIs are addressed by this rule, in the face of increasing CO-MRSA, more direction may be necessary. The following recommendations are intended to provide additional guidance for food establishments with regard to food handlers with MRSA infections.

**Evaluate:** Food handlers should be advised on the necessity of self reporting all skin lesions, no matter how minor, including lesions that resemble a “bug bites,” or other pustule skin lesion that appears to be infected. Any unusual skin lesion or other draining wound is potentially infectious to others and infection control measures should be in place to prevent the spread of infection.

**Refer:** When a SSTI is suspected, the food handler should consult their primary care provider for evaluation and treatment. The food handler with a suspected SSTI should be restricted from activities requiring direct contact with food or food contact surfaces until evaluated by a physician.

**Communicate:** Following the medical evaluation, the food handler may be asked to provide verification of the healthcare provider’s treatment plan to food establishment management prior to having direct contact with food or food contact surfaces.

**Prevention strategies:** It should be emphasized with food handling staff that hand washing is the single most important behavior in preventing the transmission of infectious disease. Hands should be washed for at least 15 seconds with soap and water.

- Food handlers who have a SSTI or a MRSA infection should follow the healthcare provider’s treatment plan, including completion of any antibiotics prescribed.
- Keep actively draining wounds covered with clean, dry bandages. The food handler should follow the healthcare provider’s instructions on proper care of the wound.
- Regardless of whether the SSTI is MRSA, food employees with draining wounds on the hands, wrists, or exposed portions of the arms should be restricted from activities requiring direct contact with food or food contact surfaces until the wound has stopped draining or unless the wound is covered with an impermeable cover in addition to the bandage. [30](#)
- When in doubt of the most appropriate course of action to follow regarding food safety, contact your local sanitarian or the Montana DPHHS Food & Consumer Safety Section-Retail Food Program (406-444-2089).

## **H. Pets and other animals<sup>5</sup>**

Recurrent MRSA infections in household contacts of colonized companion animals (pets) have been described in the community.[23, 24, 25](#) Given the evidence of transmission of MRSA between humans and animals, there is concern that pets may serve as a reservoir for MRSA in the community.[23, 24](#) The following recommendations may be applicable for owners of pets infected or colonized with MRSA.

- Pet ownership and contact information may identify risk and could be included as part of the standard history for any patient. Known MRSA status of pets or owners is often an important part of a patient's medical history.
- Pet screening should only be considered when recurrent infections are occurring within an isolated group exposed to the pet and despite repeated reinforcement of hygiene practices. Consultation with a veterinarian, as well as an infectious disease expert or the Montana Communicable Disease Control and Prevention Bureau is recommended.
- Treatment of colonized pets is not routinely indicated because there is little evidence that antimicrobial-based eradication therapy is effective in colonized pets and colonization tends to be short term.
- In exceptional circumstances, when a colonized pet is implicated as a source of infection and the infection is serious and recurrent, temporary removal of the pet from the household may be considered. While there is the potential for pets to be involved in dissemination of MRSA in the community, the beneficial effects of pet contact should be considered in any discussion about removal of the pet from the household.

## VIII. Glossary

**Carbuncle:** A carbuncle is a local, but deep, staphylococcal skin infection. It consists of several furuncles that develop close together. They expand and join together to form a larger mass (aggregation of cells) with multiple drainage points. This mass may be deeper beneath the skin surface than simple furuncles.

**Carrier:** A person who is colonized with an infectious agent. The organism may be present in the nares (nose), sputum, urine, an open wound, in the stool or on the skin without clinical manifestations of disease. A carrier may transmit the organism to another person through direct contact, usually by contact with hands.

**Colonization:** The presence of an infectious agent on tissue without the presence of symptoms of clinical manifestations of illness or infection. Example: a carrier is colonized with MRSA.

**Decolonization:** For the purposes of these guidelines, decolonization refers to the elimination of MRSA carrier state through use of infection control measures and/or antibiotics. This decreases the risk of transmission to high-risk individuals (immunocompromised or otherwise highly susceptible persons) or to others in an outbreak situation.

**Furuncle (boil):** A skin infection involving an entire hair follicle and nearby skin tissue caused by staphylococcus bacteria, which are normally found on the skin surface.

**Infection:** Invasion and multiplication of a pathogen in a tissue with the manifestation of clinical symptoms of infections such as increased white blood cell counts, fever, lesions, furuncles, drainage from a break in skin continuity and erythema.

**Invasive infection:** Clinical manifestation of symptoms caused by a pathogen such as furuncles, cellulitis, pneumonia, carbuncles, septicemia, osteomyelitis or vascular line infection.

**Methicillin-resistant *Staphylococcus aureus* (MRSA):** MRSA is a type of staph that is resistant to antibiotics called beta-lactams. Beta-lactam antibiotics include methicillin and other more common antibiotics such as oxacillin, penicillin and amoxicillin. There have traditionally been two classifications of MRSA infections; HA-MRSA and CA-MRSA. For the purposes of these guidelines CO-MRSA will also be recognized.

**healthcare-associated MRSA (HA-MRSA):** A term that refers to the strains of MRSA that are typically acquired by persons who **have** established MRSA risk factors such as recent (within the past year) hospitalization, surgery, residence in a long-term care facility, receipt of dialysis, or presence of invasive medical devices.

**community-associated MRSA (CA-MRSA)<sup>1</sup>:** A term that refers to the strains of MRSA that are typically acquired by persons who **do not have**

established MRSA risk factors and whose bacteriologic characteristics (e.g., genotypes, antimicrobial susceptibility profiles) are unique and differ from those of HA-MRSA.

**community-onset MRSA (CO-MRSA):** A more general term used to describe the location of the patient at the time which MRSA infection was identified<sup>32</sup>. This definition is not associated with particular risk factors or strain of MRSA.

**MRSA outbreak:** For the purposes of this guideline, a CO-MRSA outbreak is a clustering of four or more epidemiologically linked (“common setting” or “common venue” such as a family, school, or jail), culture positive cases within a month long period.

**Screening:** For the purposes of this guideline, screening is the attempted identification of asymptomatic carriage of *S. aureus* in a defined population. This is typically accomplished by culturing the nares.

**Transmission:** Any mechanism by which an infectious agent is spread from a source or reservoir to a person. MRSA is transmitted primarily by direct person-to-person contact.



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## X. Appendices

A. General recommendations for prevention and control of SSTIs, including MRSA, in non-healthcare settings		
Evaluation & Referral	Communication & Reporting	Prevention Strategies
<ul style="list-style-type: none"> <li>• Individuals, caretakers, and staff members of group settings should take an active role in identifying skin infections such as unusual skin lesions, draining wounds, or “bug bites” that may require further evaluation.</li> <li>• When a SSTI is suspected, individuals should be referred to their primary care provider for evaluation.</li> <li>• The individual with a suspected SSTI should refrain from skin to skin contact with other individuals until evaluation is complete.</li> <li>• The individual should follow the healthcare provider’s treatment plan including completion of any antibiotic regimens, if prescribed.</li> </ul>	<ul style="list-style-type: none"> <li>• Following a medical evaluation the individual or caretaker should notify the person in charge of health issues for that setting so that appropriate prevention strategies may be implemented.</li> <li>• If a cluster or “outbreak”(see <b>Section V: Surveillance and Reporting</b>) of MRSA is suspected within a defined setting, contact the local public health department for consultation.</li> </ul>	<p><b>Education</b></p> <ul style="list-style-type: none"> <li>• Education of the individual or caretakers is critical to SSTI case management and limiting further spread of infection within the setting or among close contacts.</li> <li>• Some settings may consider developing policies and providing training and education for employees regarding MRSA infections.</li> </ul> <p><b>Wound Management</b></p> <ul style="list-style-type: none"> <li>• Keep wounds that are draining, covered with clean dry bandages.</li> <li>• If the wound is unable to be kept covered with a clean, dry bandage at all times, the individual should not participate in activities requiring skin to skin contact with other persons until the wound is healed.</li> </ul> <p><b>Hygiene</b></p> <ul style="list-style-type: none"> <li>• <u>Hand washing is the single most important behavior in preventing the transmission of many infectious diseases.</u> It is an essential step to limiting the spread of organisms that cause SSTIs.</li> <li>• Clean hands regularly with soap and warm water or, if hands are not visibly soiled, alcohol-based hand gel (at least 60% ethyl alcohol). Always clean hands immediately after touching infected skin or any item that has come in direct contact with a draining wound.</li> <li>• Maintain good general hygiene with regular bathing.</li> <li>• Do not share items that may become contaminated with wound drainage, such as towels, clothing, bedding, bar soap, razors, and athletic equipment that touches the skin.</li> </ul> <p><b>Environmental</b></p> <ul style="list-style-type: none"> <li>• Clean environmental surfaces with which individuals have bare skin contact with a detergent/disinfectant that is suitable for the type of surface being treated and that specifies <i>S. aureus</i>. A 1:100 solution of diluted household chlorine bleach (2.5 Tablespoons bleach in 1 gallon of water) can be used for non-porous surfaces (See Appendix A).</li> <li>• Normal laundry washing and drying destroys most pathogenic bacteria. Launder clothing/linens that have come in contact with wound drainage after each use and dry thoroughly on a hot temperature cycle.</li> <li>• Gloves should be worn and care should be taken when handling laundry soiled with body fluids from individuals who have an SSTI including those with an MRSA-SSTI. Wash hands after handling soiled laundry, even if gloves were worn. Dispose of gloves after a single use.</li> </ul>

## B. Using Bleach for Environmental Disinfection

### For routine disinfection of nonporous surfaces<sup>34</sup>:

Use a 1:100 dilution (500-615 ppm) of household chlorine bleach.

### For disinfection of spills of blood/body fluids<sup>34</sup>:

Use a 1:10 dilution (5,000-6,150 ppm) of household chlorine bleach.

### Contact Time:

Bleach solutions should be left on surfaces for 5-10 minutes to achieve maximum disinfection.

### Preparation of bleach solutions:

For this dilution table, household bleach is diluted to the desired concentration.

Household bleach is a solution of sodium hypochlorite (NaOCl) which generally contains ~5.25% chlorine. “Ultra” concentrations of bleach contain 6-7.35% hypochlorite and are not recommended to avoid producing higher than intended concentrations of chlorine.

	Desired Chlorine Concentration		
	parts per million (%)	Ratio bleach:water	Preparation
Dilution of standard (5.25%) bleach. Prepared fresh for use within 24 hours	500 ppm (0.05%)	<b>1:100</b>	2 ½ tablespoons (1/6 cup) bleach in a gallon of water
	1,000 ppm (0.1%)	<b>1:50</b>	5 tablespoons (1/3 cup) bleach in a gallon of water
	5,000 ppm (0.5%)	<b>1:10</b>	25 tablespoons (1 2/3 cup) bleach in a gallon of water

### Stability of chlorine bleach:

- Open bottles of concentrated chlorine bleach will lose effectiveness after 30 days. Change bottles of bleach every 30 days for accurate concentrations. For disinfecting, use an unopened bottle of chlorine bleach.
- Chlorine solutions gradually lose strength, and therefore freshly diluted solutions must be prepared daily.

### Safety precautions when preparing chlorine solutions:

- “Thick” bleach concentrates should never be used for disinfection purposes as they contain potentially poisonous additives.
- 1:10 bleach solution is caustic. Avoid direct contact with skin and eyes.
- Bleach solutions give off chlorine fumes. Prepare them in a well ventilated area.
- Do not use metal containers for mixing and storing bleach solutions as they corrode rapidly and may also affect the bleach.